

Operating Instructions

Electrical Glycol Heating for Tank Container

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1. General Description

1.1 Field of Application

The glycol heating which we have developed covers the requirements of approx. 90% of all container tank heating systems, since the temperature range of most heating media is 20°C to 90°C [120 °C]. The maximum contact temperature of tank wall to the product can never be higher than that of the flow temperature, which can be adjusted to 105°C [140°C] maximum. The standard heating medium 60/40% water/glycol has an temperature operating range of -20 ...95°C [100% glycol max. operating range -5 ...125°C].

The largest part of all container tanks which have more than 6 pipelegs, can be operated using our glycol heating system. Using a suitable arrangement of stop valves either steam or glycol operation is possible.

Continous maintenance is essentially important for proper and safe operation. Considering this advise can decrease running costs and improve durableness.

2. Design

The electrical glycol heating is a closed, practically non-pressurised heating system. The heat transfer medium is a water/glycol mixture [100% glycol].

Heater, pump and monitoring equipment are accommodated in a stainless steel housing mounted at the side on the container. The electrical control and regulating units are mounted in a supplementary, robust, splash-proof insulating housing.

The transparent plastic expansion tanks should be placed as high as possible, but at least above the highest steam pocket. Tank, brackets and retaining straps are supplied separately.

The mains connection is effected via a cable TPR – F 4G4 mm² or H07 RN-F 4G4 for heavy duty with a CEE connector 5x32A,6h (4x32A,3h container version).

Feed and return flow have 32mm hose connections.

The circuit diagram consists of a durable self-adhesive plastic foil which is mounted in the housing lid.

3. Mode of Operation

After starting up of the heating system, a stainless steel circulating pump maintains the glycol circulation.

Three thermostats provide safe temperature control.

1. Product thermostat S1

Electronic industrial controller with digital display.

Measuring input: resistant thermometer PT 100

Input range: 0...+90°C [120°C]

Output: relay

The resistant thermometer could be mounted on the tank wall or put into a diving tube which is placed in the product.

2. Flow thermostat S2

Electronic industrial controller with digital display.

Measuring input: resistant thermometer PT 100

Input range: 0...+95°C [125°C]

Output: relay

3. Overheating thermostat S3

Electronic temperature limiter 0..200°C, set to 105°C [140°C].

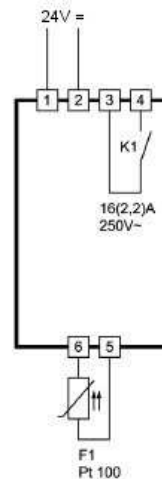
If the product temperature falls below the temperature set at the product thermostat, the heating switches on, and off again when the flow or product temperature is exceeded.

The continuous delivery by the recirculating pump prevents an accumulation of hot spots and ensures even heat distribution.

The overheating thermostat protects the system from overheating at 105°C [140°C], and is released via a reset key.

4. Service and Adjustment

The controller for pre-flow and product temperature are in normal operation mode for the user.
The displays and control elements are shown below.



Description



UP key

By pressing this key the parameter or parameter value is increased.



DOWN Key

By pressing this key the parameter or parameter value is decreased.



SET key

The display normally shows the actual value. When the SET key is pressed, the display changes to show the control setpoint.

Menue level (First control level)

After doing a short self test, the thermostats show the actual value.

Pushing the SET-button, the display switches from current value to setpoint. To adjust setpoint, keep SET-button pressed and change setpoint with up- and down-button. After reaching new setpoint release buttons and new setpoint will be stored in non fluctuating memory. The up- down- button have to be released always first. This so called two-finger operation will avoid the user from changing setpoint uncontrolled.

Second control level (P-Parameters):

Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing control parameters (starting at parameter P2).

With the UP and DOWN keys the list can be scrolled in both directions.

Pressing the SET key will give you the value of the respective parameter. Pressing also the UP or DOWN key at the same time the value can be adjusted. Release the UP or DOWN button before releasing the SET button and the new value is saved into the non-volatile memory.

Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Parameter	Function	adjustable Range	Standard- setting	Customer- setting
P2	Hysteresys K1	0,1...99,9K	1,0K	1K (S1) 3K (S2)
P4	Control range limitation – minimum setpoint	-99°C...P5	-99°C	0°C
P5	Control range limitation – maximum setpoint	P4...999°C	999°C	50°C
P6	Actual Value Correction	-20,0K...+20,0K	0,0K	-6,0K (S1) -0,5K (S2)

Third control level (A-level)

Access to the third control level is granted when selecting the last P-parameter on the second control level. Continue to press the UP key for approximately 10 seconds until "PA" appears. Continue to press the UP key and additionally press the DOWN key for about 4 seconds and the first A-parameter of the third control level is indicated.

With the keys UP and DOWN you can scroll the list in both directions. Pressing the SET key will give you the value of the respective parameter. By pressing the UP or DOWN key at the same time the value can be adjusted.

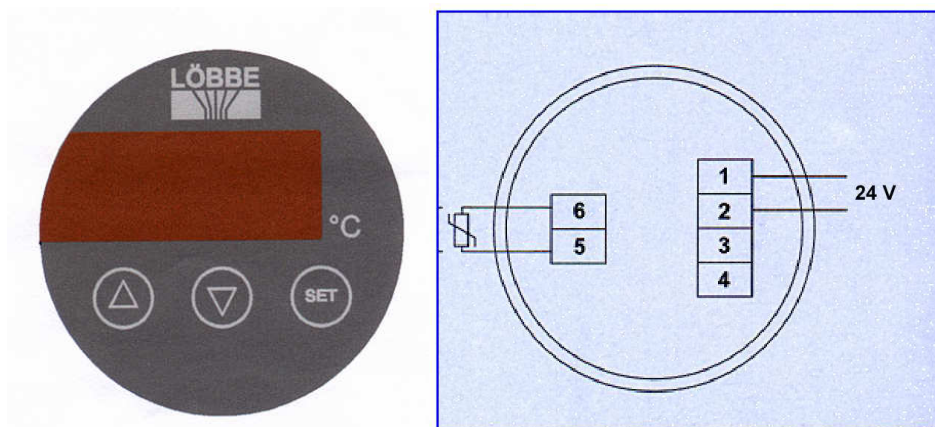
Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Parameter	Function	adjustable Range	Standard-setting	Customer-setting
A1	Switch mode K1	0: heating contact 1: cooling contact 2: function alarm K1 3: function alarm K1 inverted	at Pt100: 0	0
A8	Display mode	0: integrals 1: decimals in 0.5°C 2: decimals in 0.1°C	1	0

Status display (error codes)

Display	Error	What to do
F1L	sensor short circuit	new sensor
F1H	sensor failure	new sensor
F3L	Boundary alarm Temperature low (actual value < P30)	look at parameter P30, P31, P32, A30, A31
F3H	Boundary alarm Temperature high (actual value > P31)	look at parameter P30, P31, P32, A30, A31
F3	Range alarm Temperature in between boundaries (P30 < Istwert < P31)	look at parameter P30, P31, P32, A30, A31
---	Keyboard lock active	look at parameter P19 bzw. A19
EP	lost of data in EE-Prom (Kontakt K1 and K2 are off)	If by switching the line voltage off/on the error is still present → repair of controller

If an error is located in EEprom (Display EP) and in that case the stored parameters could not be used, the controller contacts are switched off.

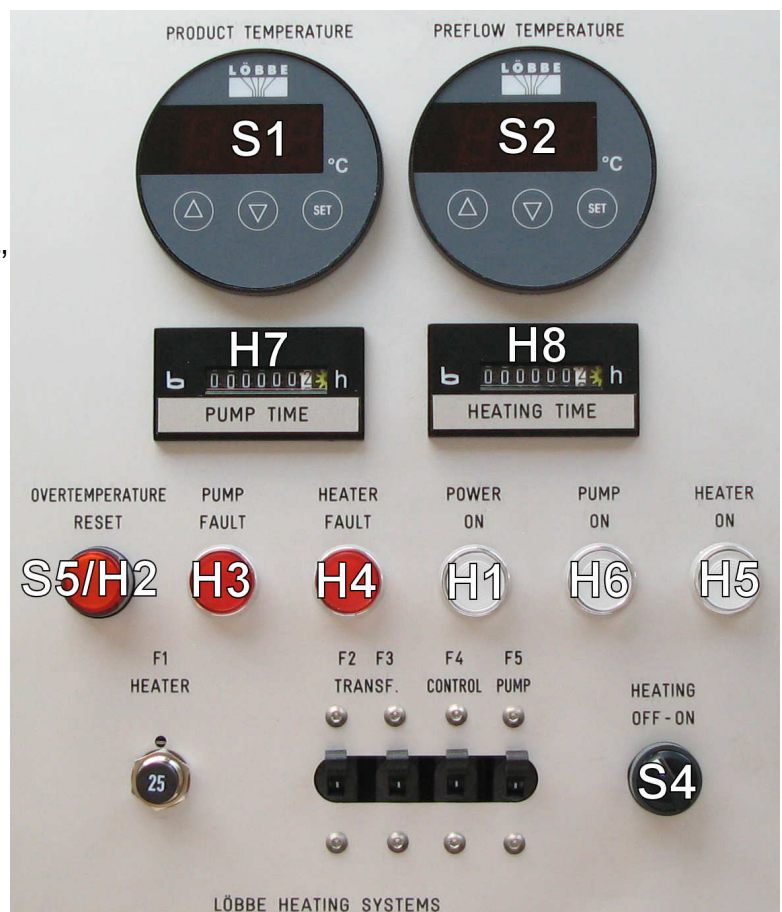


S3 Overheating thermostats:

Electronic temperature limiter with PT100. The sensor is attached inside the heater element, the thermostat is mounted below the transparent covering of the terminal box in the heater housing, set at 105°C [140°C] and must not be readjusted. If the temperature is reached, the heating incl. the pump shuts off. After elimination of the fault, which causes the overheating, the heating unit can be restarted by pushing the reset button.

Operation devices and messages

- H1** Signal light white
'Netz Ein' - 'POWER ON'
- H3** Signal light red
'Störung Pumpe' - 'PUMP FAULT'
- H4** Signal light red
'Störung Heizstab' - 'HEATER FAULT'
- H5** Signal light white
'Heizung Ein' - 'HEATER ON'
- H6** Signal light white
'Pumpe Ein' - 'PUMP ON'
- H7** Hours counter
'Pumpzeit' - 'PUMP TIME'
- H8** Hours counter
'Heizzeit' - 'HEATING TIME'
- S1** Temperature controller
'Produkt' - 'Product Thermostat'
- S2** Temperature controller
'Vorlauf' - 'Preflow Thermostat'
- S4** Selector switch
'Heizung AUS – EIN' - 'Heating OFF – ON'
- S5/H2** Illuminated push button red
'Übertemp/Reset' - 'OVERTEMP/RESET'



4.1 Initial Operation

Prior to the initial operation, the system must be filled with glycol (mono- or 1,2 polypropylene-glycol). This is achieved by removing the blanking plug at the expansion tank and by filling the system, using a 3-way ball valve, until the fluid becomes visible in the expansion tank.

Prior to switching the heating on, the product thermostat **S1** should be set to its minimum value and then the heater off-on switch **S4** switched on, so that the recirculating pump vents the system without switching on the heating element and so avoid overheating.

If necessary top up with fluid during venting. Lift container at least 3 to 4 times at the front and back by about 30 cm, so that the air can escape from the steam halves of the tubes.

Refit the blanking plug.

4.2 Heating Operation

- 4.2.1 Check heating fluid in expansion vessel ! (must be visible !).
- 4.2.2 Set product-thermostat **S1** to required product temperature.
- 4.2.3 Set flow-thermostat **S2** at least 10°C higher than product-thermostat.
- 4.2.4 Plug in CEE-connector plug. The control light **H1** 'power on' must illuminate.
- 4.2.5 Switch on switch **S4** 'Heizung Aus-Halbe-Volle Leistung' ('heating off-half-fullpower').
The control light **H6** 'Pumpe Ein' ('PUMP ON') illuminate, the recirculating pump run.
- 4.2.6 If the product temperature is lower than the temperature set at the product-thermostat **S1**, the heating switches on, the control light **H5** 'Heizung Ein' ('HEATER ON') must illuminate.

5. Fault Diagnosis

Warning! Remove mains plug prior to opening the electrical switch box!

5.1 Control light **H1** 'POWER ON' does not illuminate:

- Test whether CEE-connector plug is correctly plugged in.
- Test whether mains voltage is available.
- Test whether control fuses **F2-F4** are switched on.

5.2 Illuminated push button **S5/H2** 'Übertemperatur' ('OVERTEMPERATURE') illuminates:

- Limiter has switched.
- Proof heating fluid level in the expansion vessel. If necessary, fill up with glycol.
- Loose possibly blocked pump.

5.3 Control light **H3** 'Störung Pumpe' ('PUMP FAULT') illuminates:

- Motor protective switch **F5** has triggered. Loose possibly locked pump.
- Reconnect motor protective switch **F5** in on position.

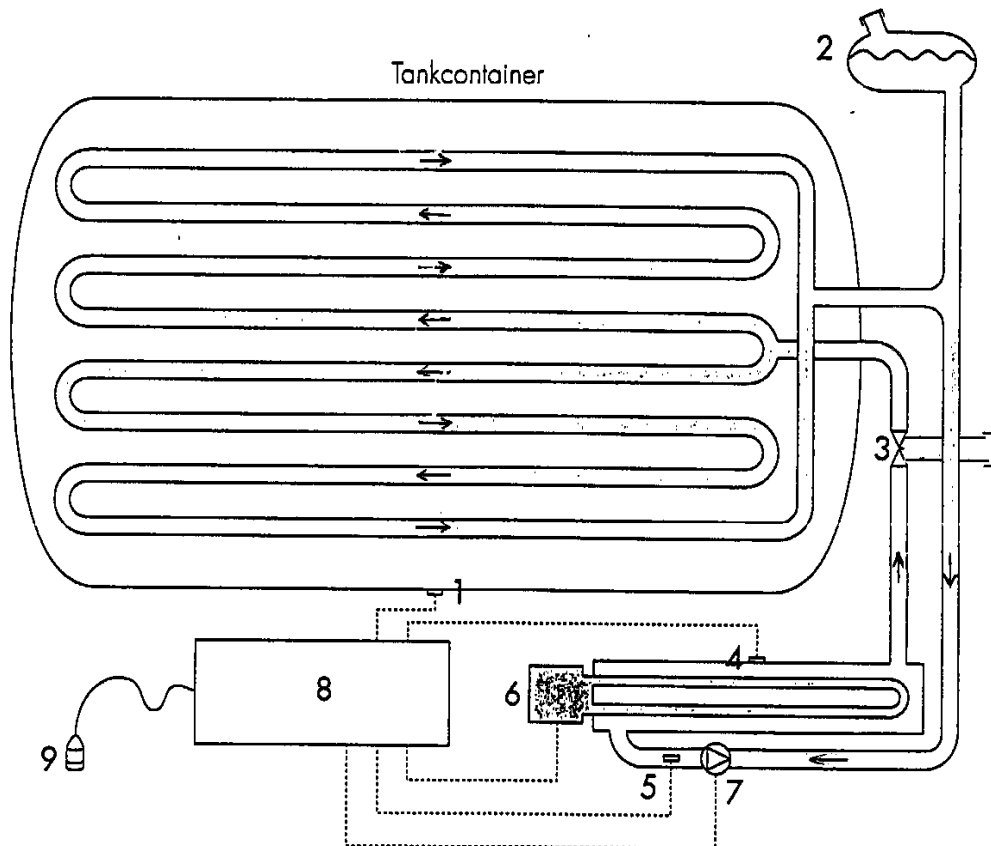
5.4 Control light **H4** 'Störung Heizung' ('HEATER FAULT') illuminates:

- Power switch **F1** has triggered.
- Check heating element and reset power switch **F1**.

5.5 Control light **H5** 'Heizung Ein' ('HEATER ON') does not light up, although the product temperature is set lower than at the product-thermostat **S1**.

- Flow thermostat **S2** is set too low. Flow thermostat **S2** should be set approximately 10°C higher than product-thermostat **S1**.

6. Diagrammatic Section



- 1 - Product - thermostat S1
- 2 - Expansion tank
- 3 - 3-way valve
- 4 - Limiter S3
- 5 - Flow - thermostat S2
- 6 - Heater
- 7 - Pump
- 8 - Electrical control unit
- 9 - Mains supply

9. Technical Data

Dimensions:	L x W x H = 1500 x 285 x 200 mm (heater box) L x W x H = 300 x 600 x 140 mm (control box)
Weight:	ap. 75 kg
Connecting voltage:	3 x 440 V, 60 Hz + 5%/-10% 3 x 400 V, 50 Hz + 10%/-10% via CEE-connector 5 x 32 A, 6h (4 x 32 A, 3h)
Heating output:	12000 W at 440 V, 60 Hz 9900 W at 400 V, 50 Hz
Recirculating pump:	195 W, ap. 0.9 A
Current consumption:	15,8 A at 440 V, 60 Hz 14,5A at 400 V, 50 Hz
Glycol feed and return flow:	32mm hose connection